

TELUM

Interactive Software for Integrated Land Use and Transportation Modeling

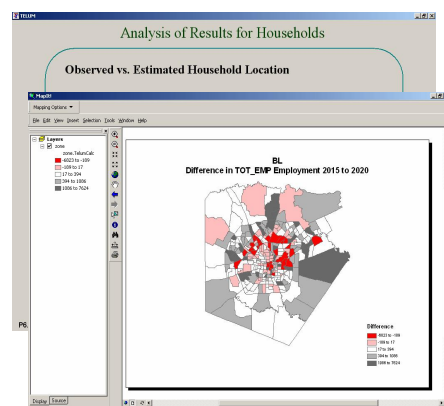


New Jersey's Science & Technology University

TRANSPORTATION ECONOMIC
AND LAND USE SYSTEM (TELUS)

Introduction

- TELUM is a land use modeling software package that can be used for evaluating land use impacts of regional transportation improvement projects.
- TELUM forecasts future location of employment and households.
- Developed under the federal TELUS grant as a standalone modeling software.



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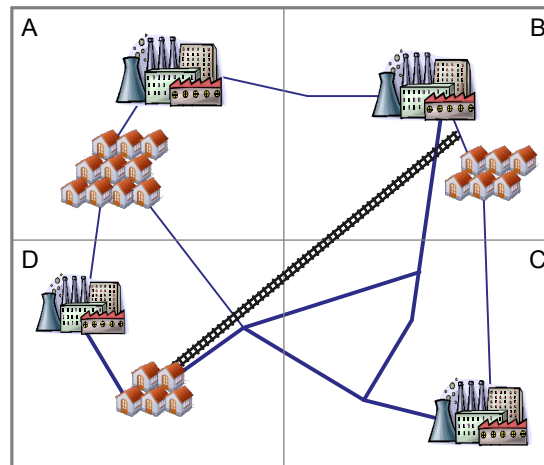
What Is a Land Use Model?

A land use model is a quantitative method which . . .

- Forecasts employment and population demand for location in specific zones of a region;
- Calculates the amount of employment and population that will be located in each zone;
- Calculates the amount of land that will be used by the locating activities.

Understanding TELUM – Spatial Interaction Model

The plan is to build a can-
tainer rail service that will use 4
freight cars to haul goods and
passenger jobs and
passengers will pay
less than those who
travel on other regional
lines. The new
line will be built in
the zone, as a result
of jobs and
passenger travel
and will be able to
travel on the same
improved travel times,
certain zones and jobs
in the zone will
be able to travel
and will be able to
use will be like
location of existing
jobs and households.



Motivation

- Majority of MPOs neither uses Land Use Models for regional forecasting nor for providing input to travel models. This is due to the lack of trained in-house personnel with experience in land use planning*.

TELUM is developed as intuitive, interactive software package with many user-friendly features. It is easy to understand, provides tools for easy data entry and analysis, and features Help System that provides instructions and is able to guide and advise users throughout their analysis. It is primarily developed for small and medium-sized MPOs.

* Determination of the State of the Practice in Metropolitan Area Travel Forecasting: Findings of the Surveys of Metropolitan Planning Organizations, April 7, 2006, Prepared for Committee B0090, TRB/National Research Council

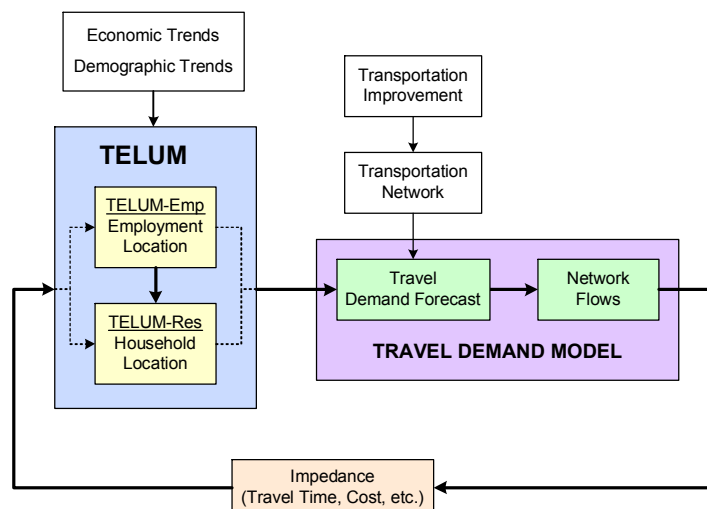
Advantages – Why Should You Use TELUM?

- TELUM enables planners to perform regional land use analysis by providing forecasts of employment and residence locations;
- Inputs consist of US Census data and supplemental data commonly used by MPOs in regional planning process;
- User friendly interface makes it easy to navigate through data input, model development, and forecasting process;
- A combination of hotlinks to internal help files, with software wizards in a Knowledge Based Systems approach leads the user through the many steps in model implementation;
- Integrated GIS module allows mapping of the input data, calibration results, and forecast results.

Transportation Policy Analysis

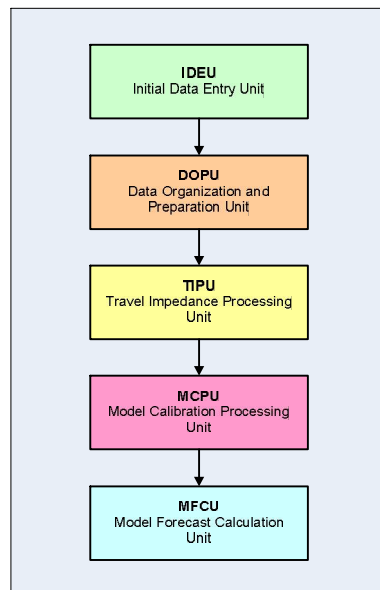
- TELUM provides planners with the ability to compare various transportation improvement scenarios:
 - Planners can make changes in the transportation network between runs and observe the resulting changes in land use patterns;
 - Planners can test impacts of different project pools on regional land use patterns by applying different sets of impedances for the same model year.
- TELUM outputs can be used as a starting point for the trip generation, trip distribution, and mode-split.

TELUM's Role in Travel Demand Forecasting



Land Use Model Outputs – How can they help?

Output	Planning Implications
Employment Density (forecasted for each zone and employment category)	Use: estimating future payroll tax revenues, change of zoning/land use and improvements of the transportation network to promote desired development scenario.
Household Density (forecasted for each zone by household income category)	Use: estimating future property taxes, change of zoning/land use and improvements of the transportation network to promote desired location of residences throughout the region.
Land Consumption (forecasted for each zone by household/employment category)	Use: provides an estimate of intensity of land utilization by households and employment by category, indicating how land use will change as a result of location of population and jobs for different development scenarios.
Density Gradient (measure of urban sprawl)	Use: by measuring change in household density as one moves from the CBD to suburbs can help identify trends in long-range regional plans



TELUM Software Modules

- **IDEU** – Basic information about the region necessary to organize data.
- **DOPU** – Data entry and data consistency checks.
- **TIPU** – Load and process travel impedance data.
- **MCPU** – Self-calibration of employment, household and land consumption forecasting models.
- **MFCU** – Performs forecasts for the baseline and user-defined policy scenarios.

Data Entry

IDEU and DOPU modules provide a user friendly, interactive interface that helps the user define what kind of data is available for the analysis region, and subsequent data entry. Several data-checks are conducted along the way to ensure data consistency and data integrity.

TELUM also provides tips for creating a dataset required for a successful development and execution of a land use model.

IDEU Report

Summarizing the organization of regional socioeconomic data

Initial Data Entry Unit Report

Name of the Region: Des Moines Number of Zones: 183

Estimated Total Population: 394000 Current Year: 2000 Lag Year: 1995

Employment Data Available
Current Year: ☐ by Type ☐ by Total ☐ None
Lag Year: ☐ by Type ☐ by Total ☐ None

Number of Employment Categories: 8 Employment Categories: C, F, G, H, I

Household Data Available
Current Year: ☐ by Type ☐ by Total ☐ None
Lag Year: ☐ by Type ☐ by Total ☐ None

Number of Household Categories: 4 Household Categories: J, K, L, M, N, O, P

Total Land Area of the Region: 285500

Land Use Data Available for Your Project
☒ Usable ☒ Unusable ☒ Basic ☒ Commercial ☒ Residential ☒ Street/Highway ☒ Vacant/Developable Land

Forecast Time Periods: 5

Empl-to-PHH Conversion: ☐ PUMS Ratio ☐ Default Ratio
Empl per HH by Income: ☐ Empl per HH Ratio ☐ Default Ratio
Unemployment Rate: ☐ UR Ratio ☐ Default Ratio
Net Commutation Rate: ☐ NCR Ratio ☐ Default Ratio
Regional Jobs Per Employee: ☐ RJPPE Ratio ☐ Default Ratio

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DOPU Data Entry Spreadsheet

Area	Residential	Basic (Industrial)	Commercial	Streets	Vacant Developable	Unusable Land	Total
1	852.50	0.00	6.19	420.41	3889.90	4763.95	5171.09
2	571.69	18.85	78.40	458.06	6509.75	228.59	7636.84
3	386.29	51.39	400.31	347.78	3784.36	97.01	4978.14
4	869.78	29.40	139.03	434.21	7317.10	69.58	8789.60
5	442.84	42.42	100.63	326.14	4178.93	86.59	5096.96
6	664.21	18.40	71.21	440.56	5804.93	104.64	6222.32
7	1009.66	6.35	524.58	499.77	238.09	637.13	2358.44
8	722.20	18.67	6.53	395.95	427.95	340.84	1571.30
9	842.50	18.93	138.37	348.18	2688.47	82.36	3948.35
10	972.16	69.40	223.94	423.10	7179.68	21.41	8878.29
11	532.74	0.00	40.20	219.33	4642.62	692.84	5434.90
12	467.88	58.57	9.32	851.51	2628.79	1557.23	4887.27
13	568.24	67.45	49.13	137.82	7988.88	163.41	8721.92
14	278.64	0.09	93.31	26.09	4738.31	235.90	5128.44
15	353.20	0.00	14.73	296.76	2381.29	81.15	3046.86
16	89.25	86.58	240.60	250.52	1382.48	401.50	2857.43
17	256.72	119.62	158.53	193.46	17.27	894.86	737.59
18	573.88	0.00	29.21	192.22	29.78	1292.21	825.01

DOPU – Data Consistency Report

Statistical analysis of the dataset provided in DOPU spreadsheet

Data Consistency Final Report

PERCENTAGE CHANGE
The percent change observed for DOPU variables between two time periods.
Given the short span between time periods, we do not expect dramatic changes between variables.

Computation From DOPU

Regional Percentage Change in Households, Lag to Current Total Households	26 %
Regional Percentage Change in Employment Lag to Current Total Employment	53 %
Regional Percentage Change in Population, Current to Forecast Year	90 %
Regional Percentage Change in Employment, Current to Forecast Year	59 %

Comments for Computations Appearing in Red Type Additional Comments

LAND USE CHECK
Here we are comparing the Total Land value you entered for your region in IDEU against the Total Land calculated from your DOPU data. Zero indicates there is no difference between the two values.

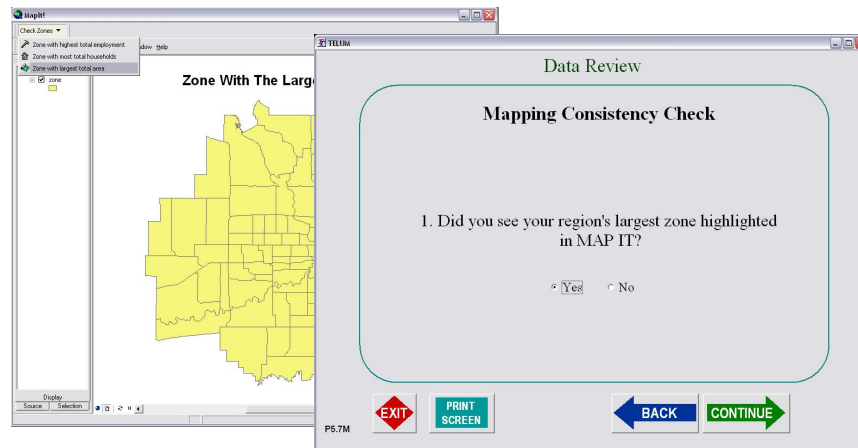
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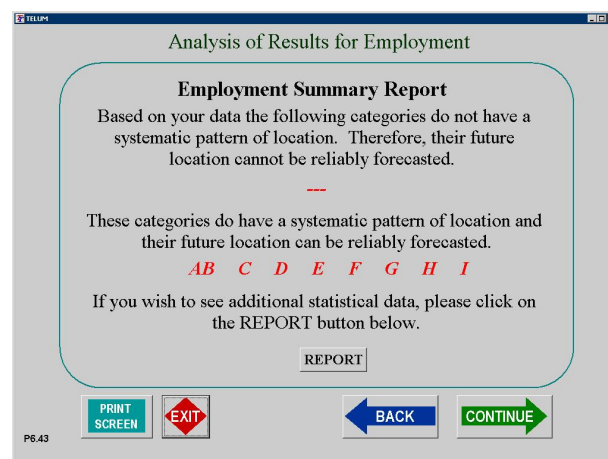
DOPU – Map and Data Compatibility

TELUM checks for the compatibility of the dataset and regional map.

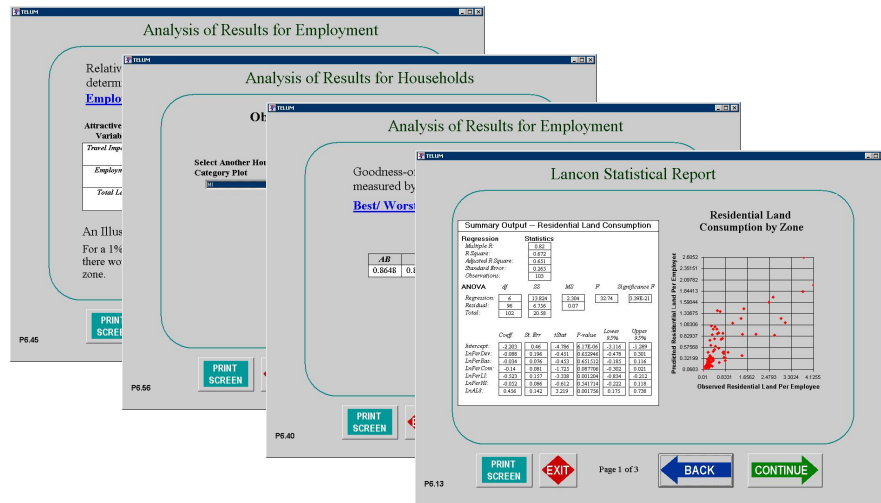


Model Calibration – Report

A summary of the model calibration report

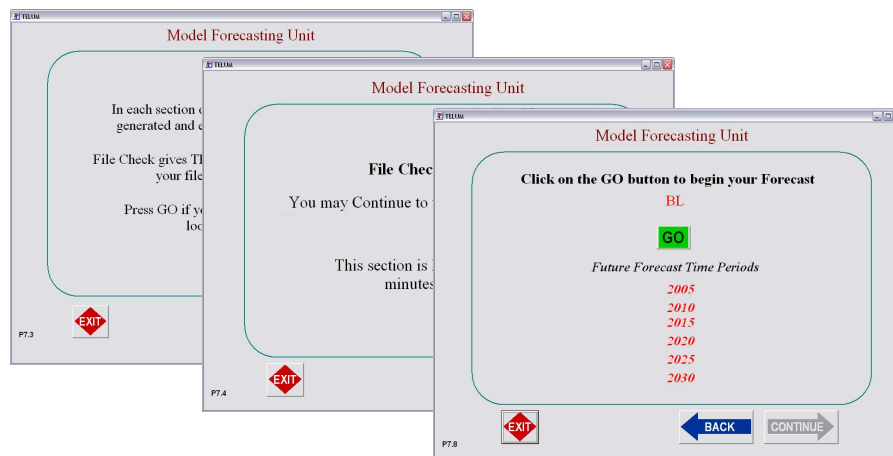


Calibration Results – Statistical Analysis



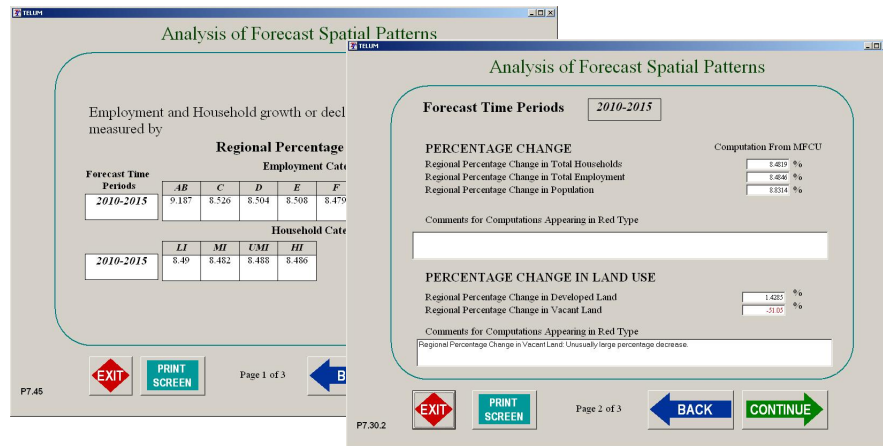
Forecasting

Tracking input and output files and running forecasting model



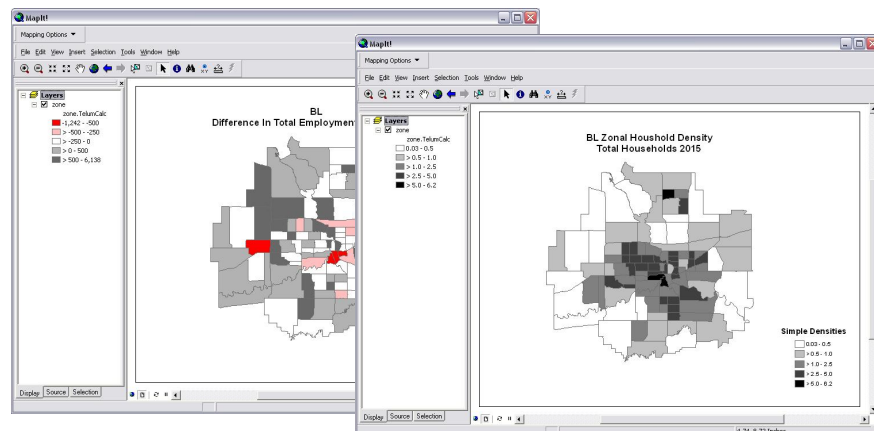
Forecast Results

Forecast report summary tables



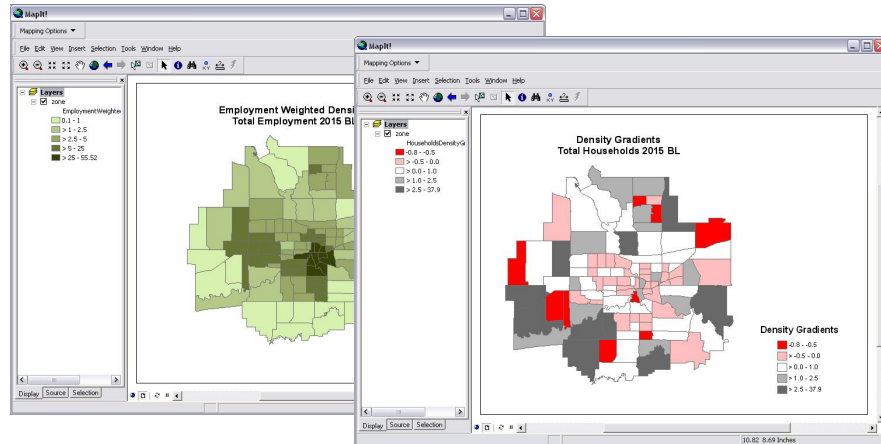
Forecast Results

MAPIT generated maps of forecast growth and/or decline of employment and households by zone



Forecast Results

MAPIT generated maps of forecast sprawl indices

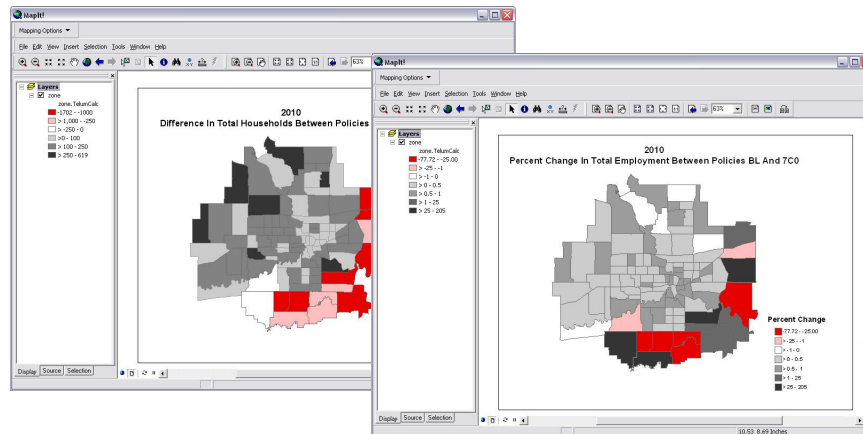


Forecasting – Adding Constraints

Using one of the four types of constraints user can test different development scenarios.

Forecast Results – Comparing Scenarios

MAPIT: mapped changes in forecast results between different scenarios



Current Program Status

- **TELUM** software package was released in January 2006. It was used by the Pikes Peak Area COG in Fall 06 as part of their new regional transportation plan. Missoula Office of Planning and Grants and Pueblo Area Council of Governments are currently testing TELUM. Used by Des Moines (IA) and Little Rock (AR) MPOs.
- Software, User Manual, and Tutorial can be downloaded from TELUS website:

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Thank you!